

REMARKS

Claims 1-20 are now pending in the application. Minor amendments have been made to the specification and claims to simply overcome the objections to the specification and rejections of the claims under 35 U.S.C. § 112. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

Claims 1, 10, 16, 17 and 19 stand amended. Claim 5 is cancelled.

SPECIFICATION AND DRAWINGS

The specification stands objected to for certain informalities. Applicants have amended the specification according to the Examiner's suggestions. Therefore, reconsideration and withdrawal of this objection are respectfully requested.

The drawings stand objected to for certain informalities. Applicant(s) have attached revised drawings for the Examiner's approval. In the "Replacement Sheet" Fig. 2 has been corrected.

- a. Applicants have amended the specification as per Examiner's suggestion. The specification at the end of page 12 now reads as follows: "where $s_k(t)$ is the score at time t , and φ is the node's parent, a node such that $a_{\varphi k} \neq -\infty$. Further, $d_k(t)$ is defined to the emission log probability of the current observation." This definition also remedies other situations pointed out by the Examiner in page 15.
- b. Applicants have amended Fig.2 as per the Examiner's suggestions. The root node now points to both the 'k' node and the 'h' node. Figure 2 shows how the

tree that is used to illustrate the invention can be stored in memory as a contiguous array. Even though the tree is stored as an array in memory, the traversal is still as per the tree traversal paradigms. Figure 4b is an example of how the tree can be traversed. Hence, the description is proper in illustrating the storage of the tree in memory as Fig. 2 and traversal of the tree Fig. 4, because storage and traversal are two separate but related issues.

In Fig. 4 the bottom arrow shows that the deepest node is within the last column to the right. Each level of nodes is designated as a column with arrows at the top. The figure also shows where the process starts at right-most column's first node (dark colored), which is shown as pointed with an arrow labeled '0'. Next the process jumps to next node (dark colored) within the same rightmost column with an arrow labeled as '1'. This clearly indicates "increasing order within a given column". The applicant respectfully submits that the drawing includes adequate information to illustrate the relevant description in the specification.

- c. The Examiner has made certain observations regarding the algorithm on page 14. The Applicants have made some minor corrections to the algorithm. The algorithm is best understood in context of Fig. 4b. At the start of the algorithm, smallest ranked node "B" is the starting active node with smallest probability score (an illustration for calculation of probability score is given on page 12, lines 18-22). The operation of the algorithm is well-described through out the specification. A particular example can be found in pages 14-15 of the specification.

- d. The Examiner has stated that "...page 17, lines 9-22, the trees 74 and 76 in Fig. 4a should be same as tree 72 for consistence, but they are not." Office action, page 3, paragraph "d.". The Applicants respectfully submit that there is no error in description on page 17 of the specification because the description correctly identifies Timeline 72 as a timeline and not a tree. Hence, there is no question of any consistency between items 72, which is a timeline and 74 and 76, which are active node envelopes.
- e. The Applicants graciously thank the Examiner for point out the typographical errors that are now corrected.

CLAIM OBJECTIONS

The Examiner has object to certain sections of claims. Applicant respectfully submits that the claims are well-supported by the specification. Particular objections and clarifications are listed below.

- 1, "a set of traversal rules" (Claims 1 and 10) lacks antecedent basis:

The feature "set of traversal rules" is well supported by the specification. For example, the description including the algorithm on page 14 gives a set of traversal rules, where "Traversal starts at the active node greatest depth and then proceeds in increasing order within a given column." (page 14, lines 4-6). Broadly, the traversal rules specify a traversal method that starts with the deepest nodes and then traversing to the root in column-by-column manner. Hence, the above recitation is well-supported by the specification.

2. "nodes of a given generation are processed before...processed" and "deepest child generation ...first"

The Applicants respectfully submit that disclosure on pages 18-page 22 refers to the search algorithms behavior on a temporal (time) scale with propagation of active envelopes. While the features "nodes of a given...processed" and "deepest child...first" are supported throughout the specification, particular example can be found on page 14 that can be easily understood with help of Fig. 4b. For example, "The preferred traversal path is illustrated in Figure 4b. Traversal starts at the active node of greatest depth and then proceeds in increasing order within a given column. Once all active nodes within a column have been traversed, the path proceeds to the previous column.

The presently preferred algorithm proceeds....". Page 14, lines 3-18.

The above description clearly shows how the nodes are traversed starting from the deepest child generation in the right-most column (see Fig. 4b) towards the root node.

REJECTION UNDER 35 U.S.C. § 103

Claims 1, 3 and 5-16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kao (U.S. Pat. No. 6,374,222) in view of Mitchell (U.S. Pat. No. 6,574,595). This rejection is respectfully traversed.

Claims 2, 4, and 17-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kao (U.S. Pat. No. 6,374,222) in view of Mitchell (U.S. Pat. No. 6,574,595) and further in view of alleged well-known prior art (MPEP 2144.03. This rejection is respectfully traversed.

The Examiner has cited the Kao reference as disclosing the traversal features of claim 1. The Kao reference is directed to reducing memory footprint of a speech recognition system. Kao uses a particular reduced slot-type data structure (col. 9, lines 10-18), to reduce the memory requirements. Kao, unlike the Applicants invention does not use any active node envelopes and specific traversal techniques in its disclosure. Kao rather is generally directed to a garbage-collection like technique using slots to reduce memory requirements.

Claim 1 now stands amended. Kao does not disclose any “set of traversal rules whereby nodes of a given generation are processed before the parent nodes...” The Examiner has stated that Col. 4, lines 58-60 discloses this feature of claim 1. However, Kao merely suggests traversal in backward manner (Kao, “propagate the current time stamp backward...”, col.4, lines 58-63) to eliminate and reuse slots to prune the bad-scored path, col. 4, lines 55-63. Claim 1 is not directed to simple backtracking kind of tree traversal to save memory. However, Claim 1 is directed to a different purpose than Kao’s disclosure which merely eliminates (reuses) or retains slots to reduce memory requirement. Claim 1 includes recitations for a traversal method that starts at the deepest level (“deepest child generation is processed first”) and where **“at least two nodes of a given generation** are processed before parent nodes...” indicating that all nodes in a generation are processed first before a backward movement towards the root node. Then the traversal progresses backward towards the root (“in the same topological direction”).

Further, Kao or other general tree traversal algorithms where a traversal, in any direction, is from one generation to next generation (parent-to-child or child-to parent).

This is so because in tree data structures by its very nature traversal to a node of same generation is usually via the parent node. However, the traversal technique underlying the Applicants' invention processes **"at least two nodes of a given generation"** before moving to the parent generation. For an easy understanding reference may be made to Fig. 4b where processing is done column-wise, i.e., generation-by-generation. Neither Kao nor Mitchell disclose column-by-column (in context of Fig. 4b for explanatory purposes) processing of nodes first before traveling back towards the root node. Therefore, Kao does not disclose the traversal technique of claim 1 and hence cannot be combined with Mitchell to render claim 1 as obvious. Hence, the Applicants respectfully request the Examiner to withdraw the rejection of claim 1 and allow the same.

Claims 2-4, 6-9 and 19 depend on claim 1 and hence are allowable for at least the same reason(s) as Claim 1.

Claims 10 stands amended. As amended the Claim 10 includes the recitations "said mechanism for designating selected ones of said nodes as active nodes defines an active envelope" and "said...uses a set of rules to propagate the active envelope". Kao clearly does not disclose an active envelope. Mitchell is considered next.

The Examiner has pointed out Mitchell's col.4 , lines 2-6 as disclosing an active envelope. Mitchell discloses a simple technique of maintaining a linked list of pointers called a "decoding tree" that stores a list of pointers to "viable" phonemes. At the end most likely phoneme sequence is extracted by simply traversing the decoding tree. While Mitchell may disclose a linked list of viable phonemes, there is nothing in Kao or Mitchell to show that it is an active envelope that is propagated by a set of rules. Unlike,

the propagation of an active envelope following a set of rules, Mitchell does not indicate that its decoding tree is propagated as a unit for any function, but rather that it is simply traversed to extract the list of most likely phonemes that it was keeping track of. Hence, Mitchell and Kao cannot be combined to render claim 10 as obvious because neither of them suggest an active envelope and a mechanism that “uses a set of rules to propagate the active envelope.” Therefore, the applicants respectfully request the Examiner to withdraw the rejection of claim 10 and allow the same.

Claims 11-18 and 20 depend on claim 10 and hence are allowable for at least the same reason(s) as claim 10.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the

Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: Dec 16, 2003

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